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TO THE ASSISTANT COMMISSIONER FOR PATENTS

Transmitted herewith for filing under 35 U.S.C. 111 and 37 C.F.R. 1.53 is the patent application of:

PRASAD V. UPADRASTA

For: FACILITATING SEARCHING ON MULTICAST RECEIVERS

Enclosed are:

- ☒ Certificate of Mailing with Express Mail Mailing Label No. EL445652921US
- ☒ Seven (7) sheets of drawings.
- ☐ A certified copy of a application.
- ☒ Declaration ☒ Signed. ☐ Unsigned.
- ☒ Power of Attorney
- ☐ Information Disclosure Statement
- ☐ Preliminary Amendment
- ☒ Other: Recordation Form Cover Sheet; Assignment and check for \$40.

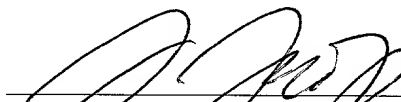
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CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	35	- 20 =	15	x \$18.00	\$270.00
Indep. Claims	9	- 3 =	6	x \$78.00	\$468.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
BASIC FEE					\$690.00
TOTAL FILING FEE					\$1,428.00

- ☒ A check in the amount of \$1,428.00 to cover the filing fee is enclosed.
- ☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. 20-1504 as described below. A duplicate copy of this sheet is enclosed.
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 - ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

Dated: July 11, 2000


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APPLICATION

FOR

UNITED STATES LETTERS PATENT

**TITLE: FACILITATING SEARCHING ON MULTICAST
RECEIVERS**

INVENTOR: PRASAD V. UPADRASTA

Express Mail No.: EL445652921US

Date: July 11, 2000

FACILITATING SEARCHING ON MULTICAST RECEIVERS

Background

This invention relates generally to multicasting information through a broadband medium to a plurality of receivers.

5 A broadband server may multicast selected information to a plurality of receivers. Each of these receivers may be coupled to the server through a broadband connection. For example, the receivers and the server may be coupled over the Internet. Each of the receivers may be able to
10 receive a relatively high data rate of information. Thus, information may be pushed from the broadband server to the receivers.

 The receivers may designate the types of information they wish to receive. Thereafter, the broadband server may
15 push the selected information to the receiver at regular intervals. For example, a given receiver may receive information about national news events relating to technology topics.

 Eventually, a receiver may have so much information
20 that it becomes difficult, even within the requested categories, for the user of the receiver to locate information of interest. That is, a server may push information at regular intervals to a receiver so that over

time a considerable database of information may be stored by the receiver. Then, when the user of the receiver wishes to find a particular piece of information, it is relatively difficult to do so.

5 Within any given document, the find function on some browsers may be utilized to conduct limited searches through the document. However, the ability to search through a wide range of documents pushed over time to the receiver may be limited. While software may be available
10 that enables an index table to be developed on the receiver, such software involves a large number of machine instructions and may tie up the receiver's resources.

 Thus, there is a need for better ways to enable multicast receivers to search for information pushed to the
15 receivers by a broadband server.

Brief Description of the Drawings

Figure 1 is a schematic depiction of one embodiment of the present invention;

Figure 2 is a flow chart for software on a processor-
20 based system to facilitate searching of multicast data;

Figure 3 is a flow chart for software on a multicast receiver in accordance with one embodiment of the present invention;

Figure 4 is a flow chart for software on the broadband
25 server in accordance with one embodiment of the present invention;

Figure 5 is a flow chart for software on the server in accordance with another embodiment of the present invention;

Figure 6 is a flow chart for software on the receiver in accordance with still another embodiment of the present invention; and

Figure 7 is a flow chart for software on the server in accordance with the embodiment shown in Figure 6.

Detailed Description

Referring to Figure 1, a broadband server 12 may be coupled to a plurality of processor-based systems 20 over a transport medium 18. In one embodiment of the present invention, the broadband server 12 provides the information to a plurality of processor-based systems 20 coupled over the Internet by broadband access services such as satellite, cable or digital subscriber line (DSL) as examples. The processor-based systems 20 may be any processor-based system including a computer system with a storage 24 to store information pushed by the broadband server 12 to the processor-based system 20.

The broadband server 12 may include a content database 14 that may be repetitively searched for information falling into certain categories. Moreover, the broadband server 12 may offer for selection a plurality of categories of information. Thus, each processor-based system 20 may request that the server 12 push information that falls in

certain categories to the processor-based system 20. Any processor-based system 20 may provide a request, for example over the back channel 22, for a particular category of information. Then when information in that category comes to the server 12, it may be identified and passed to the processor-based system 20 without any further request. The technology for providing categories of information to receiver continually without a renewed request is referred to herein as push technology.

The broadband server 12 may also include a storage 16 that stores software 46 that may be useful in controlling its operations. Conventionally, the broadband server 12 is also a processor-based system.

The processor-based system 20 and its storage 24 may store content received from the broadband server 12. In addition, the storage 24 may store software 25 and 35 that is useful in controlling the processor-based system 20 and enabling it to operate as an effective receiver of the content pushed by the broadband server 12 to the system 20.

Referring next to Figure 2, the software 25 stored in the storage 24 begins by determining whether a user initiated search request has been received as an input command, in accordance with one embodiment of the present invention. If a search request has been received, as indicated at diamond 26, the software 25 locates an index table as indicated in block 27. An index table is a table

that references certain key words to content pushed by the broadband server 12. The index table may normally be provided by the broadband server 12 together with the content in the requested categories.

5 After the processor-based system 20 has located the index table, it searches the index table to find words that match the keywords submitted by the user as indicated in block 28. If a hit is identified, as indicated in diamond 30, the hit information is displayed as indicated in block 32. For example, the information may be displayed in a summary or capsule format on a display coupled to the processor-based system 20.

10 Conversely, if a hit is not identified, a graphical user interface may be displayed on a display, as indicated in block 34. The interface may afford the option to conduct a search over the Internet, for example by way of the back channel 22 as one example. Of course, the search may also be submitted over the transport medium 18 in another embodiment.

15 Turning now to Figure 3, the process of receiving the information is illustrated in connection with the software 35 in accordance with one embodiment of the present invention. When content and index table is received over the transport 18, as determined in diamond 36, the content is parsed from the index table (block 38) provided by the broadband server 12. The user may select to accumulate the

index tables received with each transmission from the broadband server 12 to create a unified, searchable index table. Alternatively, the user may prefer to search the index table for each push session; that is, to search within the content provided with a given transmission from the broadband server 12.

If the user wishes to accumulate the index tables, the user sets a flag, identified at diamond 40 in accordance with one embodiment of the present invention. The new index table is then added to an index table database, as indicated in block 42. If the user has so set the flag, the index table provided with the content is added to the existing index table database built up over time from other push content received from the broadband server 12.

Thereafter, the content that has just been received and the new index table are stored as indicated in block 44.

The broadband server 12 may use the software 46, shown in Figure 4, in accordance with one embodiment of the present invention. The server 12 continually accumulates and searches for categories of content to push to the processor-based systems 20 as indicated in block 48. When it finds sufficient information in one or more categories requested by processor-based systems 20, the server 12 may push that information to the processor-based systems 20.

Alternatively, when a scheduled push time arrives, as indicated in diamond 50, the server 12 may prepare to push

whatever content it has accumulated up to that instance to the receiving processor-based systems 20. However, before pushing the content, the server 12 may develop the index table for the information about to be pushed to the processor-based systems 20, as indicated in block 52.

Thereafter, the index table with the content may be pushed over the transport 18 to the requesting processor-based systems 20, as indicated in block 54.

By developing the index tables on the server 12 for all of the requesting processor-based systems 20, a more efficient system is achieved. This efficiency arises because each processor-based system 20 need not independently undergo the duplicative process of developing the index table from the information provided by the server 12. Instead, the server 12 may compile the index table at one time for all the requesting processor-based systems 20. This facilitates searching on the processor-based systems 20 since a search may be implemented more quickly after the content is pushed from the server 12. Moreover, the processing power of each processor-based system 20 is not needlessly tied up in developing index tables.

The autocast software 60, shown in Figure 5, may be resident on the storage 16 associated with the broadband server 12. Initially, the software 60 receives client requests for content as indicated in block 62. Those requests may be accumulated and organized by the content

requested as indicated in block 64. Based on this organization, the server gets feedback on what information is needed at one or more processor-based systems 20. When it is determined that a particular object or content is requested frequently, as determined in diamond 66, that object may be scheduled for multicast in the next upcoming multicast from the server 12 to the systems 20.

Referring next to Figure 6, the receiver monitor software 70 may be resident on the storage 24 of a processor-based system 20. Initially, the software 70 determines whether content has been accessed on the processor-based system 20, as indicated in diamond 72. If so, the content access is accumulated as indicated in block 74. In other words, the nature of the content accessed may be determined and a count incremented to indicate how often that content is actually accessed.

A check at diamond 76 determines whether a predetermined time period has arrived. If not, the flow iterates. Otherwise, the accumulated access information on the processor-based system 20 is automatically transmitted to the broadband server 12, for example over the back channel 22, as indicated in block 78.

The server monitor software 80, resident on the storage 16 associated with the broadband server 12, receives the access information from one or more systems 20 as indicated in block 82. The access information is then

compared to multicast logs that list the content intended
to be transmitted to the various processor-based systems
20, as indicated in block 84. The multicast logs may then
be adjusted based on the access information as indicated in
5 block 86. As a result, the information that is broadcast
is fine tuned to account for what is actually being used on
the processor-based systems 20.

While the present invention has been described with
respect to a limited number of embodiments, those skilled
10 in the art will appreciate numerous modifications and
variations therefrom. It is intended that the appended
claims cover all such modifications and variations as fall
within the true spirit and scope of this present invention.

What is claimed is:

1 1. A method comprising:
2 receiving content;
3 generating an index table for said content; and
4 multicasting said content and said index table
5 over a medium to a plurality of receivers.

1 2. The method of claim 1 wherein multicasting said
2 content includes pushing said content to a plurality of
3 receivers.

1 3. The method of claim 1 including determining
2 whether a scheduled multicast time has arrived and if so
3 multicasting said content and said index table over said
4 medium to a plurality of receivers.

1 4. The method of claim 1 including receiving a
2 request from one of said receivers for content in a
3 particular category.

1 5. The method of claim 4 including receiving a
2 request over a back channel for push content over said
3 medium.

1 6. An article comprising a medium storing
2 instructions that enable a processor-based system to:
3 receive content;

4 generate an index table for said content; and
5 multicast said content and said index table over
6 a medium to a plurality of receivers.

1 7. The article of claim 6 further storing
2 instructions that enable the processor-based system to push
3 said content to the plurality of receivers.

1 8. The article of claim 6 further storing
2 instructions that enable the processor-based system to
3 determine when a scheduled multicast time has arrived and
4 to multicast said content and said index table over said
5 medium to the plurality of receivers at said scheduled
6 multi-cast time.

1 9. The article of claim 7 further storing
2 instructions that enable the processor-based system to
3 receive a request from one of said receivers for content in
4 a particular category.

1 10. The article of claim 9 further storing
2 instructions that enable the processor-based system to
3 receive a request over a back channel for push content over
4 said medium.

1 ~~11.~~ A system comprising:
2 a server;
3 a storage coupled to said server storing
4 instructions that enable said server to receive content,
5 generate an index table for said content, and multicast
6 said content and said index table over a medium to a
7 plurality of receivers.

1 12. The system of claim 11 wherein said storage
2 further stores instructions that enable the server to push
3 said content to the plurality of receivers.

1 13. The system of claim 11 wherein said storage
2 further stores instructions that enable the server to
3 determine when a scheduled multicast time arrives and when
4 said scheduled multicast time arrives multicasts said
5 content and said index table over said medium to the
6 plurality of receivers.

1 14. The system of claim 11 wherein said storage
2 further stores instructions that enable the server to
3 receive a request from one of said receivers for content in
4 a particular category.

1 15. The system of claim 14 wherein said storage
2 further stores instructions that enable said server to

3 receive a request over a back channel for push content over
4 said medium.

1 ~~16.~~ A method comprising:
2 receiving content together with an index table
3 from a server;
4 parsing said index table from said content; and
5 storing said index table and said content.

1 17. The method of claim 16 including receiving at
2 least two multicast transmissions, each transmission
3 including content and an index table, and automatically
4 accumulating said index tables from each of said multicast
5 transmissions.

1 18. The method of claim 17 including determining
2 whether a flag is set that indicates that said index tables
3 should be cumulated.

1 19. The method of claim 16 further including
2 conducting a search for a keyword in said index table.

1 20. The method of claim 19 including determining
2 whether the keyword is located in said index table and if
3 not, indicating that the keyword was not found.

1 21. The method of claim 20 including indicating that
2 a search may be conducted over a back channel when the
3 keyword was not found in said index table.

1 22. An article comprising a medium storing
2 instructions that enable a processor-based system to:
3 receive content together with an index table from
4 a server;
5 parse said index table from said content; and
6 store said index table and said content.

1 23. The article of claim 22 further storing
2 instructions that enable the processor-based system to
3 receive at least two multicast transmissions, each
4 transmission including content and an index table, and
5 automatically accumulate said index tables from each of
6 said multicast transmissions.

1 24. The article of claim 23 further storing
2 instructions that enable the processor-based system to
3 determine whether a flag is set that indicates that said
4 index table should be accumulated.

1 25. The article of claim 22 further storing
2 instructions that enable the processor-based system to
3 conduct a search for a keyword in said index table.

1 26. The article of claim 25 further storing
2 instructions that enable the processor-based system to
3 determine whether the keyword is located in said index
4 table and if not, to indicate that the keyword was not
5 found.

1 27. The article of claim 26 further storing
2 instructions that enable the processor-based system to
3 indicate that a search may be conducted over a back channel
4 when the keyword is not found in said index table.

1 28. A system comprising:
2 a processor; and
3 a storage coupled to said processor, said storage
4 storing instructions that enable said processor to receive
5 content together with an index table from a server, parse
6 said index table from said content, and store said index
7 table and said content.

1 29. The system of claim 28 wherein said storage
2 stores instructions that enable the processor-based system
3 to receive at least two multicast transmissions, each
4 transmission including content and an index table, and
5 automatically accumulate said index tables from said
6 multicast transmissions.

1 30. The system of claim 28 wherein said storage
2 further stores instructions that enable the system to
3 conduct a search for a keyword in said index table.

1 31. A method comprising:
2 determining the content which is accessed in a
3 receiver;
4 accumulating information about the content
5 accessed on a receiver; and
6 periodically forwarding said information to a
7 server.

1 32. The method of claim 31 including receiving on
2 said receiver periodic push transmissions of the content
3 from said server.

1 33. A method comprising:
2 receiving on a server, client requests for
3 content;
4 accumulating said requests for content;
5 determining whether particular content is
6 requested frequently by a client; and
7 adjusting the content transmitted to said client
8 based on the frequency of requests for content by said
9 client.

1 34. The method of claim 33 including scheduling
2 content for transmission by multicast to said client in
3 response to a given number of requests for the particular
4 content.

1 35. A method comprising:
2 receiving information from receivers about the
3 frequency with which content on said receivers is accessed;
4 comparing the access information from the
5 receivers to information about content to be transmitted by
6 a server to said receivers; and
7 adjusting the content transmitted to said
8 receivers based on said access information.

FACILITATING SEARCHING ON MULTICAST RECEIVERS

Abstract of the Disclosure

By providing an index table with content pushed through a multicast system to a plurality of processor-based systems, searching for content on the receiving processor-based systems is facilitated. The receiving processor-based systems may parse the index table from the content and may accumulate the index tables to facilitate keyword searching through the index tables.

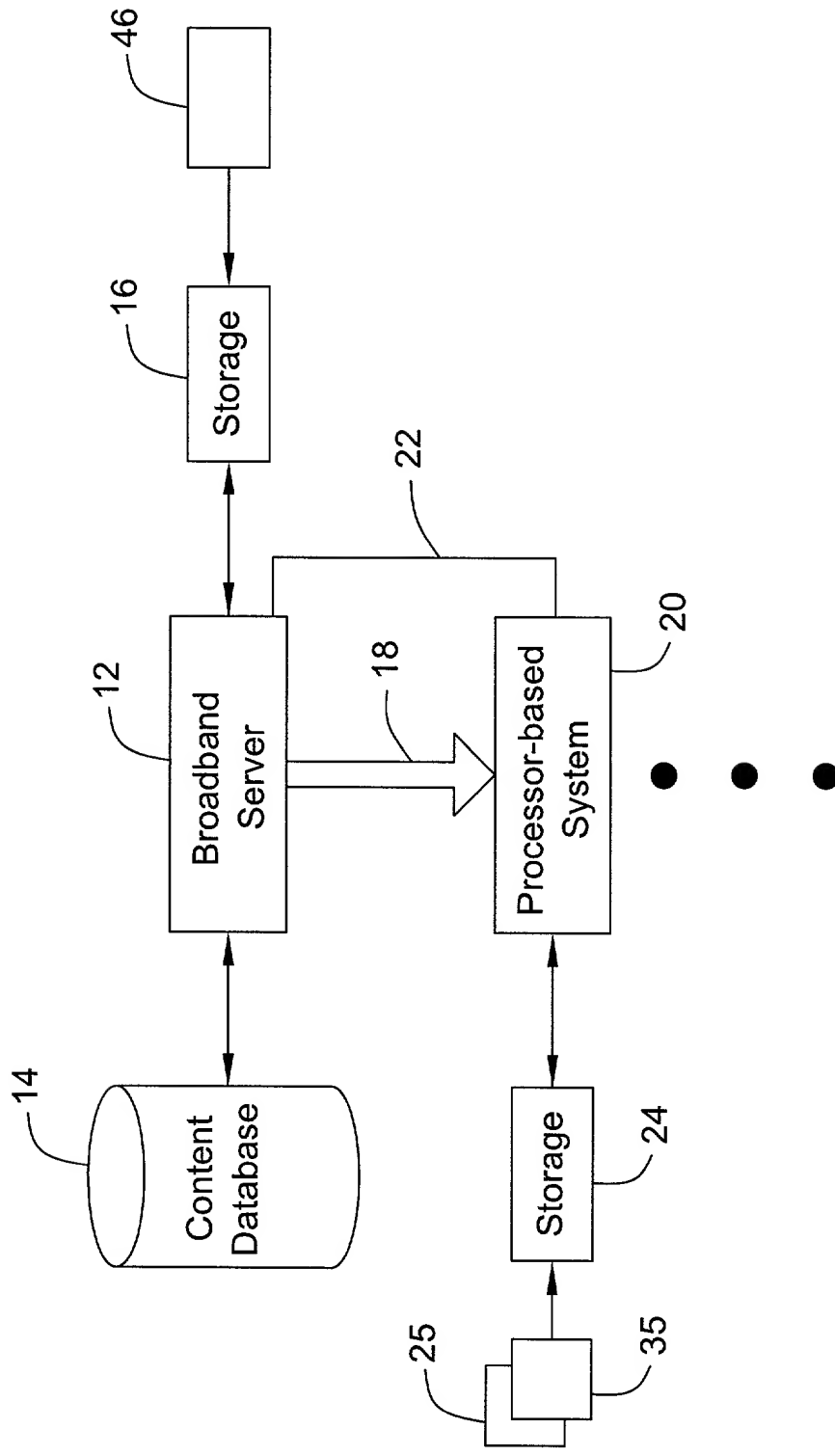


FIG. 1

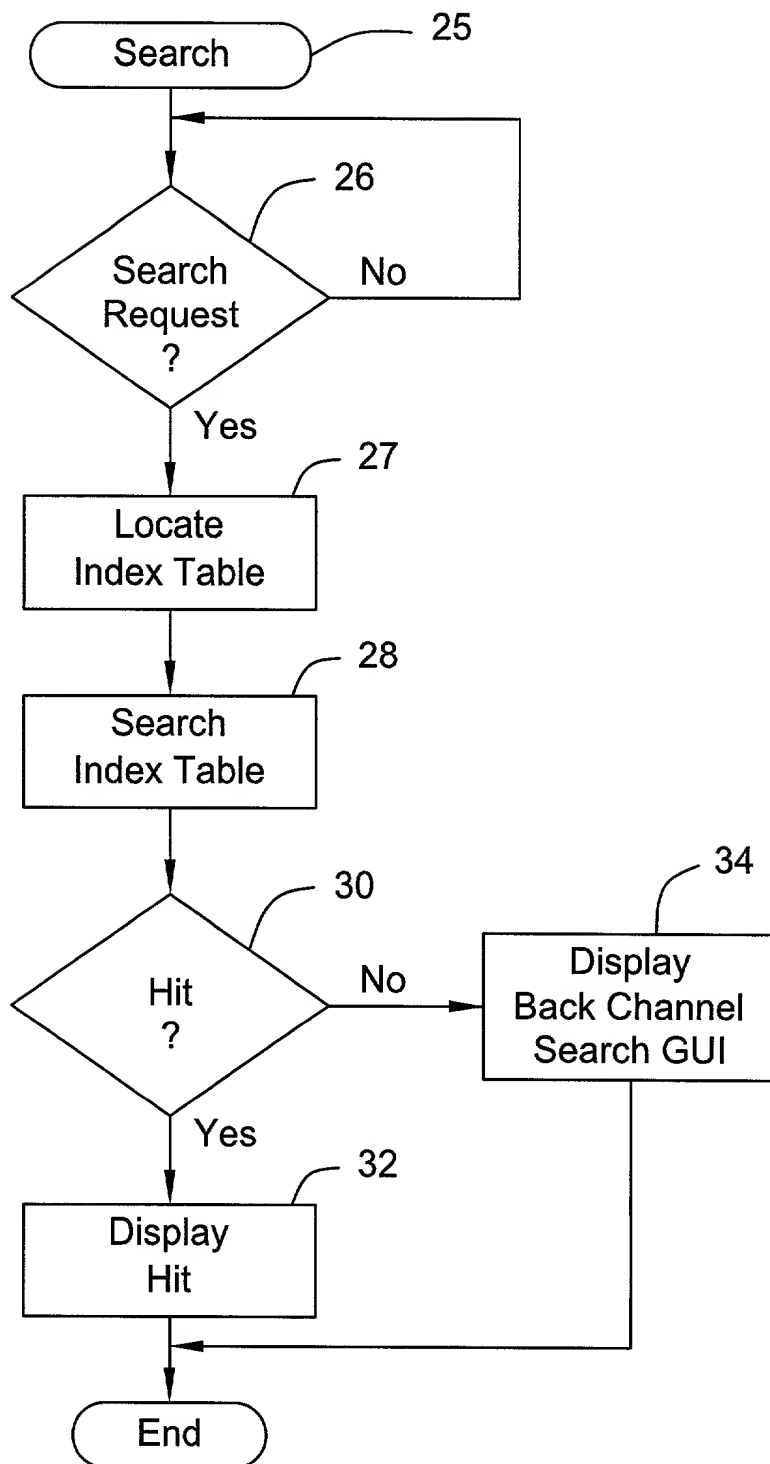


FIG. 2

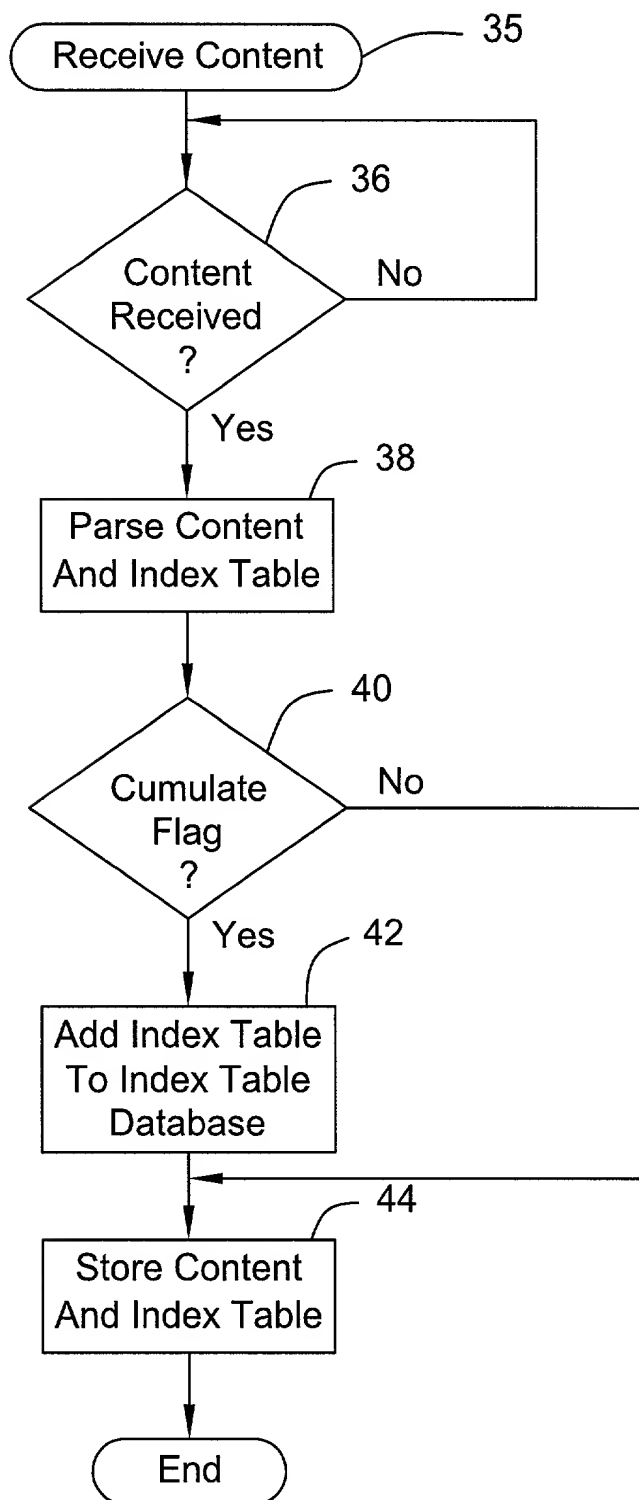


FIG. 3

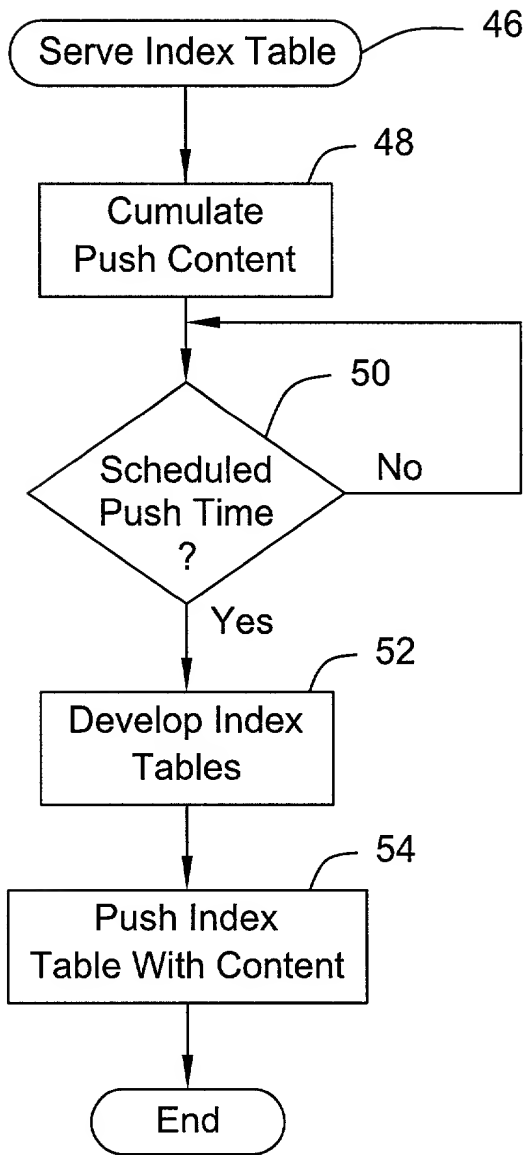


FIG. 4

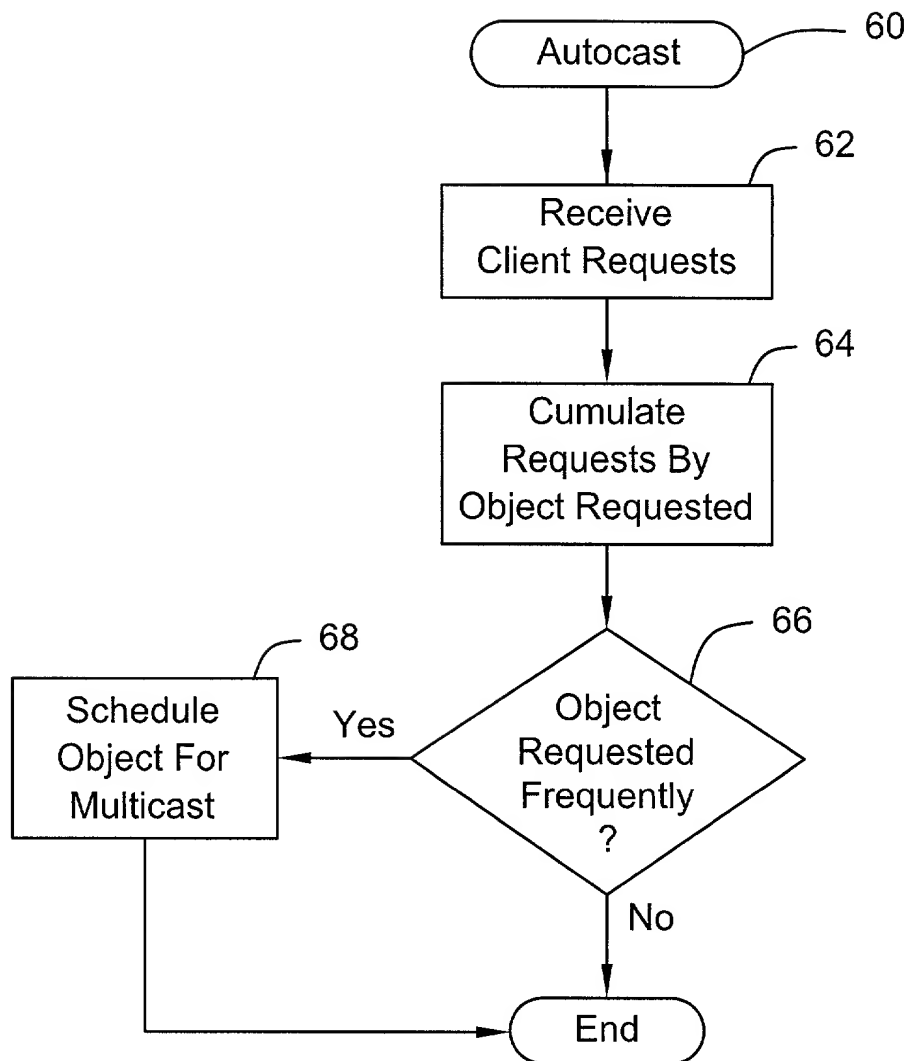


FIG. 5

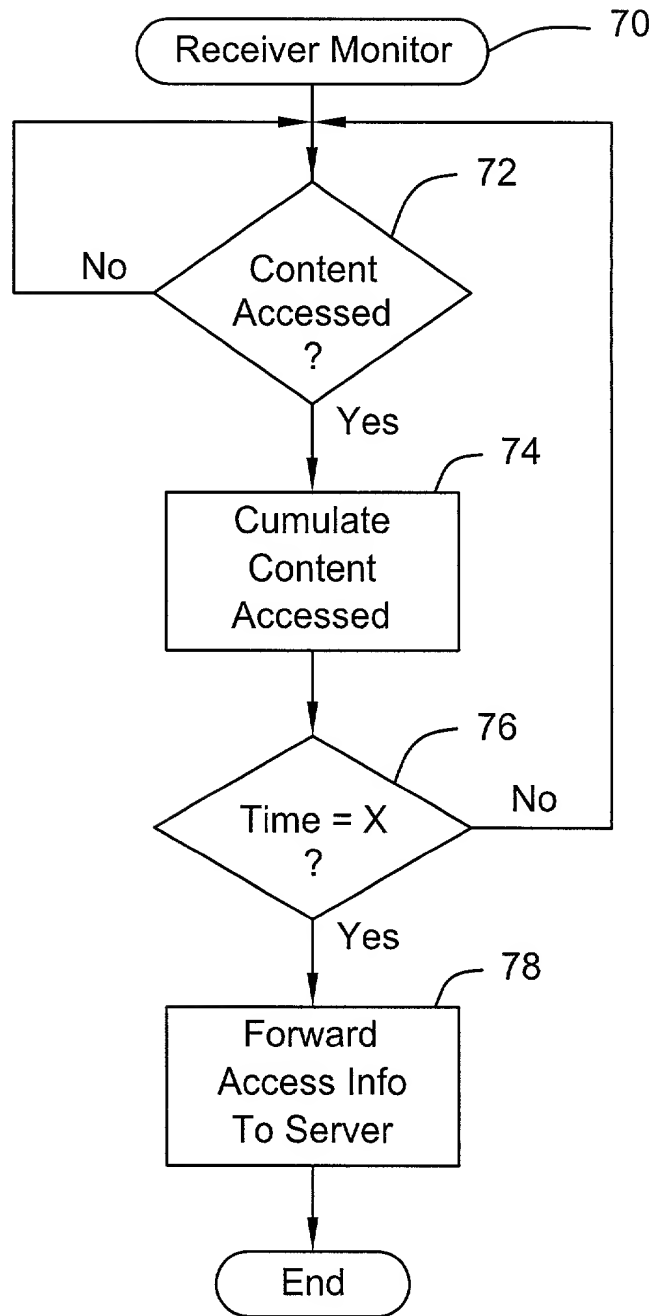


FIG. 6

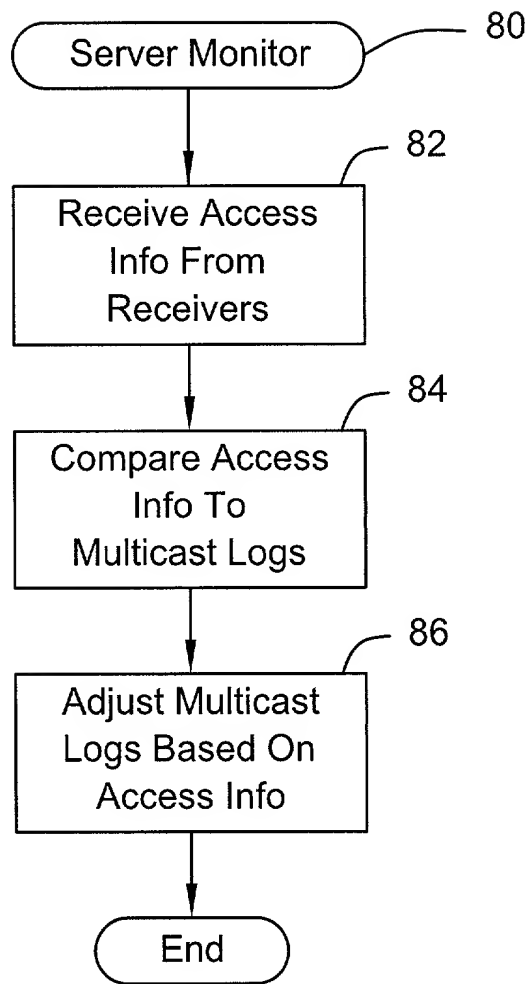


FIG. 7

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

FACILITATING SEARCHING ON MULTICAST RECEIVERS

the specification of which

X	is attached hereto.
	was filed on _____ as
	United States Application Number _____
	or PCT International Application Number _____
	and was amended on _____
	(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above. I do not know and do not believe that the claimed invention was ever known or used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and that the invention has not been patented or made the subject of an inventor's certificate Issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months (for a utility patent application) or six months (for a design patent application) prior to this application.

I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

<u>Prior Foreign Application(s):</u>			<u>Priority Claimed</u>	
Number	(Country)	(Day/Month/Year Filed)	Yes	No
Number	(Country)	(Day/Month/Year Filed)	Yes	No
Number	(Country)	(Day/Month/Year Filed)	Yes	No

I hereby claim the benefit under title 35, United States Code, Section 119(e) of the United States provisional application(s) listed below:

_____ (Application Number)	_____ (Filing Date)
_____ (Application Number)	_____ (Filing Date)

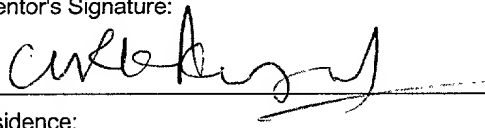
I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

_____ (Application Number)	_____ Filing Date	_____ (Status-patented, pending, abandoned)
_____ (Application Number)	_____ Filing Date	_____ (Status-patented, pending, abandoned)

I hereby appoint Timothy N. Trop, Reg. No. 28,994; Fred G. Pruner, Jr., Reg. No. 40,779 and Dan C. Hu, Reg. No. 40,025 my patent attorneys, of TROP, PRUNER & HU, P.C., with offices located at 8554 Katy Freeway, Ste. 100, Houston, TX 77024, telephone (713) 468-8880, and Mirho, Charles A.; Registration No. 41,199; Novakoski, Leo V.; Registration No. 37,198; Reynolds, Thomas C.; Registration No. 32,488; Seddon, Kenneth M.; Registration No. 43,105; Seeley, Mark; Registration No. 32,299; Skabrat, Steven P.; Registration No. 36,279; Skaist, Howard A.; Registration No. 36,008; Su, Gene I.; Registration No. 45,140; Wells, Calvin E.; Registration No. 43,256; Werner, Raymond J.; Registration No. 34,752; Winkle, Robert G.; Registration No. 37,474; and Young, Charles K.; Registration No. 39,435 my patent attorneys, of INTEL CORPORATION with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send correspondence to Timothy N. Trop, TROP, PRUNER & HU, P.C., 8554 Katy Freeway, Ste. 100, Houston, TX 77024 and direct telephone calls to Timothy N. Trop, (713) 468-8880.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Residence: CHANDLER, ARIZONA	Citizenship: INDIA
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